specimen, and thus gains a first-hand knowledge of the whole creature before commencing his final essay.

The text which the artist supplies of how and when he made his sketches, supplemented with original observations of the habits of birds and mammals, is both adequate and interesting. At the end of the volume are some beautiful studies of landscape and plant life, notably the exquisite sketch of a thistle (plate 60), snow-covered furze and pines (plate 58), the eagle's hunting-ground (plate 57)—a perfect handling of the high tops—and pheasant covert (plate 56).

The volume will do much to enhance the reputation of Archibald Thorburn as an artist, and those possessed of the necessary wealth have the opportunity of purchasing something that will live as long as the taste for Nature, high art, and beauty continues—and that remains for ever.

It is an unfortunate truism that few men, least of all artists, are recognised as supreme craftsmen during their lives. The day is coming shortly—if it has not already arrived—when the public, and even art critics, will awake to the fact that this century has produced two great artists of Nature—namely, Joseph Wolf and Archibald Thorburn—and those who possess a complete set of the work of these two masters will be very fortunate.

In the volume under review we notice only two slight errors. We have never seen a white-tailed eagle (plate 4) so dark as the specimen figured, nor have we observed a green cormorant (plate 36) with a "bushy" crest of the shape depicted.

J. G. M.

SUBMARINES AND SEA POWER.

Submarines and Sea Power. By Charles Domville-Fife. Pp. viii + 250. (London: G. Bell and Sons, Ltd., 1919.) Price 10*s.* 6*d.* net.

THE author has already written several books dealing with the development of submarines and also with their exploits on actual service under war conditions. In the present volume an attempt is made to discuss the influence of the submarine, now an important weapon in naval warfare, "on national life in time of war in order to awaken those who administer the empires of to-day and to-morrow to the need of provision against a new and growing menace which has changed the older theories of sea power."

Much of the matter in this book has already been covered in the author's previous publications, particularly that in the chapters on the evolution of the submarine. The difficulties of navigating the submarine, the restrictions imposed by limited depth of water and other hydrographical features, the conditions for favourably attacking an enemy and for escape from one, and other factors dealing with the employment of submarines, are dealt with in some detail, particularly in so far as they affect the use of naval power. The immediate effect of the German submarine menace upon our "sea power" during the Great War is discussed, and the author makes some suggestions based on our recent unpleasant experience for the guidance of future administrators.

So long as details of construction and of working the submarines are under review, the author is on safe ground, but in developing general arguments, in stating his premises, in the marshalling of his facts, and in selecting his language, he is not so happy. A plaintive appeal is made in the preface that the book may be read to the end before any definite opinion is formed. The appeal is necessary.

The author has not considered his subject on broad lines. When one has defined a submarine as a mobile ambush which can be set not only on this side of an enemy, so that he will have to encounter it in his advance, but also well within the enemy lines without incurring any serious risks, and with a considerable degree of protection by reason of its power of submergence, whilst retaining its powers of observation, the serious restrictions it imposes upon the movements of a surface fleet become almost obvious. The submarine affects enormously the tactics of a surface fleet, but the experience of the war has not shown that the submarine has appreciably altered the application of naval strategy. It will alter types of ships.

A picture is drawn or suggested of what might have happened to our sea-borne commerce had Germany possessed at the outbreak of war 1000 high-powered submarines. Such a picture is not instructive in any way in regard to the future aspect of the submarine question. The success of the German submarine—for it was undoubtedly a most successful weapon for harassing our sea power—as a matter of fact lay in its surprise application contrary to the Hague Convention. Had Germany possessed 1000 submarines Britain would have had in all probability 10,000 partial antidotes. Fortunately, such favourable conditions for surprise by submarine cannot occur again. A measure of the success of submarine activities is obtained from the book, in which it is stated that 600 merchant ships and fifty warships were destroyed, and that 1500 patrol ships, with guns and ammunition and depth-charges, and 2000 minesweepers had to be built or used in combating submarines.

The chapters at the end of the book dealing

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with sea power and some economic and international problems should be read. Attention is directed to the necessity for the revision of international law and to its enforcement in regard to matters affecting the mercantile marine. International law as developed from previous war experience must of necessity be inapplicable to wars such as that just concluded, in which, instead of small navies and armies, we had nations in arms when every import is almost certain to be contraband.

The title given to the book brings disappointment, for the author does not give a general treatment of the effect of the submarine upon sea power in the future. He pictures many trees, some of the soil, much undergrowth, but one never seems to see the forest. A. B. T.

OUR BOOKSHELF.

Studies in the Construction of Dams: Earthen and Masonry. Arranged on the Principle of Question and Answer for Engineering Students and Others. By Prof. E. R. Matthews. Pp. v+43. (London: Charles Griffin and Co., Ltd., 1919.) Price 4*s.* 6*d.* net.

WE gather from the preface that this little book is intended to be of assistance to students preparing for the examinations of the Institution of Civil Engineers, the B.Sc. (Engineering) of our universities, or other similar examinations. The text is arranged in the form of "question and answer," and includes references to some of the more important dams constructed in different parts of the world. Students who are pursuing systematic courses in the principles of engineering will find a good many statements open to criticism. Thus, at the foot of p. 1, we read: "In a low dam BC may be taken as being equal to AB." ABC is the pressure diagram, and surely this statement regarding BC is not independent of the scale of pressure employed. Again, on p. 1: "The centre of pressure passes through the centre of gravity of this triangle"; and on p. 9: "The centre of pressure acting at a point H/3 above base." On p. 3, r^bH^2 should read rbH^2, and there are several other misprints. On p. 4 the reader is told that the weight of the wall will act through the centre of gravity of the section, but receives no directions as to how to find this point, although space is wasted on p. 25 in answering the questions how to find the centre of gravity of a triangle and parallelogram. We hope that questions such as No. 7, p. 15, do not occur often in professional or university examinations: "What are the suggestions made by Molesworth relative to the thickness of high and low masonry dams?" On p. 16 we read some curious statements, and quote a typical one: "g=specific gravity of the masonry=for light masonry 130 lbs. per square foot=2·08." It is not possible in the limits of a short notice to deal with every point which might be criticised, but probably enough has been said to justify the conclusion that it would be well to give the book a thorough revision.

Immune Sera: A Concise Exposition of our Present Knowledge of Infection and Immunity. By Dr. C. F. Bolduan and J. Koopman. Fifth edition, thoroughly revised. Pp. viii+206. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1917.) Price 7*s.* net.

THE present edition of this book has been revised throughout, and fresh details have been inserted where necessary. It gives an excellent and, on the whole, a simple account of the salient facts connected with infection and immunity, antitoxins and other sera, cytotoxins, opsonins, vaccines, and other reactions of immunity, and the practitioner will find it a trustworthy guide to modern views on these subjects. We suggest that the details of the partial saturation method and of "toxin spectra" in connection with antitoxins are somewhat beyond the general scope of the work, and that the space devoted to them might be better employed in extending the more directly practical subject of agglutination. The technique of the Wassermann test for syphilis has been included in this edition in response to many requests for information concerning it. Here, again, we think that the description is too technical for the average reader, and might be simplified with advantage. These, however, are minor faults, if faults they be, and do not in any way detract from the general excellence of the book. Several figures serve to visualise the descriptions given in the text, and the book is very readable.

R. T. H.

Handbook of Mineralogy, Blowpipe Analysis, and Geometrical Crystallography. By Prof. G. Montague Butler. Pp. ix+311+v+80+viii+155. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1918.) Price 16*s.* 6*d.* net.

THIS book is in three parts, which are separately paged. They are also on sale separately. The first part consists of concise, clearly printed descriptions of the different mineral species, and should prove useful for their recognition by the student or prospector. This will be facilitated by the use of the folding tables of the physical characters of the different minerals, which are a special feature of the work. The second part deals with the blowpipe analysis of minerals. Here also the results are set out in a convenient tabular form. The third part, which is devoted to crystallography, is not so satisfactory. The author has a system peculiar to himself of describing crystal symmetry which is by no means clear. He is also exceptional at the present time in retaining the Weiss system of notation of crystal faces.

J. W. E.

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